Carolina Skies

National Weather Service, Wilmington, NC **Fall 2003**

Hurricane Season 2003

HAM Radio Support in Isabel

Volunteer licensed Amateur Radio Operators staffed NWS Wilmington through the Isabel event, arriving the night of Sep 17 and staying past landfall on Sep 18. Glenn Cox, Tim Waters, and Skywarn Coordinator Rick Tharrington maintained radio contact with HAMS in the Carolinas, sharing NWS information and gathering reports to share with NWS staff and the National Hurricane Center.

At the same time, Rick Tharrington maintained nationwide radio contact with the National Hurricane Center and military points. Rick is the National Weather Coordinator for MARS, the Military Affiliated Radio Service.

We are very fortunate to have these dedicated volunteers willing to come to the weather office during critical weather situations. Thanks very much for a job well done!

Tropical Storms

Through early October, 12 tropical cyclones reached Tropical Storm strength (1-minute sustained wind 39-73 mph) in the Atlantic Basin, including the Gulf of Mexico. Of those, six reached Hurricane Strength, (wind speeds at least 74 mph). Of those, three reached Major Hurricane status, with winds at least 111 mph - Fabian, Isabel and Kate.

Fabian developed off the Africa coast in late August and grew to Category 4 strength, with sustained winds 145 mph. Fabian crossed Bermuda on Sep 5 as a Cat 3 storm with sustained wind around 120 mph. There were a few deaths and extensive damage.

Isabel struck the North Carolina coast between Cape Lookout and Cape Hatteras on Thursday Sep 18 as a Category 2 hurricane with winds around 100 mph, causing extensive wind damage to the Outer Banks and the NC counties in the vicinity of Pamlico and Albermarle Sounds and into Virginia. However, ocean storm surge six to eight feet above normal inundated much of the area around Hatteras, and surge of eight to ten feet in the Neuse and Pamlico Rivers inundated those areas.

Isabel's winds had weakened considerably from Category 5 strength - near 160 mph, while in the open Atlantic for about two days the weekend before making landfall - the only time such a powerful hurricane was ever observed in the open Atlantic.

For this area, on Tue Sep 16, when the center of Isabel was 600 miles away, a Hurricane Watch was raised for the NC coast and a Tropical Storm Watch was raised for the SC coast south to the mouth of South Santee River. That night the Watches was changed to a Hurricane Warning from Cape Fear North, a Tropical Storm Warning from Cape Fear to Little River Inlet, and a Tropical Storm Watch for the SC coast to S. Santee River, which was elevated to a Warning on Wednesday.

Isabel followed the forecast track very closely, and winds gusted around 60 mph from Cape Fear to Surf City, causing only scattered damage to trees and roofs. Since the wind blew along the coast, and then off the coast, storm surge was around a foot or so...with most beach erosion due to the heavy surf, with breakers eight to ten feet high providing great sport for surfers. Across the inland NC counties toward I-95 and along the Grand Strand of SC, wind gusts were in the 35 to 45 mph range, with little damage.

Hurricane Kate reached Category 3 strength in the open Atlantic in early October, and then turned north without affecting land.

However, it was the remnants of Tropical Storm Bill that wreaked the worst havoc on the area. Bill made landfall in Louisiana on June 30 with sustained winds around 60 mph and weakened below 30 mph by the time it crossed NC on July 2, but there was still enough spin to develop tornadoes. In Williamsburg County a couple of tornado touchdowns destroyed or damaged mobile homes and sheds, and in Bladen and Columbus Counties tornadoes damaged homes, a turkey farm, and crops. The remnants of Bill also dropped several inches of rain, causing widespread ponding on roadways.

Frying Pan Replacement Buoy is On Hold

The National Weather Service was informed that the deployment date for the Frying Pan Shoals replacement buoy has been delayed until the end of October. The buoy will be deployed to augment the loss of data from the Frying Pan Shoals Light Tower which has been condemned and will be demolished. The new buoy will be marked red as a navigational aid in a partnership with the United States Coast Guard. The buoy will be a 3-meter discus hull maintained by the National Data Buoy Center (NDBC). The NDBC buoy hulls allow for better wave measurements and a wave direction sensor will complete the package providing mariners with detailed wave information.

Currently the instruments on Frying Pan Tower are located 44 meters above the sea surface. As a result, the wind information at that level is not always representative of the winds at the sea surface. The new buoy's anemometer will better reflect the conditions at the surface taking a lot of guesswork that is required when analyzing the data from the tower. Although Frying Pan Shoals will be missed as a landmark that mariners and forecasters have relied on over the years, the new buoy will more than adequately meet the needs of the marine community.

Climate

Temperatures across the area were slightly below normal overall for the period of April, May, and June. The below normal temperatures were mainly a result of higher than normal cloud cover and precipitation across the area. Florence saw the coolest temperatures, with averages of one and a half degrees below normal for the period.

The big story during this period was rainfall. Above normal rainfall amounts were noted for all stations area wide for the period of April, May, and June. This continued the above normal rainfall trend that began in March. A nearly stationary trough of low pressure to our west, combined with moist southeast flow from high pressure centered in the Atlantic, continued to funnel tropical moisture into the region. Area wide rainfall averages were five and quarter inches during the period, which was a little less than one and three quarters of an inch above normal. This excessive rain caused many of our area rivers to exceed their banks on several occasions. The rivers were also slow to recede due to saturated grounds. During the month of June, the area averaged 15 rain days, with Wilmington hitting an eight-day streak of rain days. Not to be outdone, the month of May saw an average of 18 rain days area wide. Normally the area averages nine rain days a month during this period. In May, Wilmington measured 3.25 inches of rainfall within a 24-hour period.

Severe thunderstorms were few and far between during this period, mostly due to excessive cloud cover which resulted in cooler temperatures. Most areas received a few wind gusts to around 50 mph, with Wilmington measuring a 71 mph wind gust from a severe thunderstorm in the first week of May.

Stay Informed - Use NOAA Weather Radio - The best way to receive warnings from the NWS

New NWR Transmitter in Georgetown County

In early September the new NOAA Weather Radio transmitter just north of Georgetown SC, was put into operation, broadcasting weather information at 162.500 mHz (VHF) for the area and coastal waters. Joining other transmitters operated by NWS Wilmington in Aynor (Horry County), Florence, Lumber Bridge (Robeson County), and Winnabow (Brunswick County), the Georgetown transmitter will alert listeners with warnings for the area.

Weather Alert Radios make the perfect gift to your family and friends. They are widely available for sale at very reasonable prices, and are as useful as smoke detectors. What better way to say you care than with the gift of a weather radio?

Spring and Summer River Flooding...And Looking Ahead to the Fall

The Wilmington, NC Hydrologic Service Area covers numerous rivers in southeast North Carolina and northeast South Carolina. The major river basins include the Cape Fear, the Pee Dee, the Waccamaw and the Black. Within this area, the Wilmington office is responsible for issuing flood warnings for 10 different locations within these river basins when they reach their established flood stage. Above the established flood stage, the flood waters begin to affect farmlands, residences, businesses and recreational facilities. It is the goal of our office to keep up with development along these rivers and ensure that those in harm's way are properly warned.

After several previous years of drought, the worst of which occurred over inland South Carolina, 2003 thus far has proven to be quite a wet year across the Carolinas. The spring and summer have brought abundant rains, keeping river levels above their normal levels and in many cases pushing these rivers into flood. Active and progressive weather systems continued to move through the Carolinas during the early spring, keeping soils saturated and rivers high. During the late spring and summer, a persistent trough of low pressure along the East Coast of the United States allowed for continued upper level disturbances to cross the region and the rain persisted. The Great Pee Dee River is one such river that has seen a tremendous amount of flooding this year. The river remained far enough inland to escape the effects of numerous hurricanes and tropical systems in the late 1990s, but made up for that loss this year. The Great Pee Dee River remained above flood stage the entire month of March and the majority of April. Although the river has a vast flood plain, the flood plain is an active location for logging operations, farming and recreation. All these outlets were impacted by the high levels. At its highest point, the Great Pee Dee near Pee Dee reached 29.48 feet on April 16. This is some 10.48 feet above the established flood stage of 19.0 at the automated river gage near Pee Dee. The gage upstream at Cheraw was inundated by the floodwaters and had to be replaced. This flood crest on the Great Pee Dee at Pee Dee was the highest level reached in decades. At the peak of the flood, thousands of acres of farmland were flooded. Logging operations along much of the river were halted for over a month and many

logging roads were washed out as a result of the flood. Businesses along the banks of the river were also adversely affected. The flooding spanned several counties along the length of the river.

As summer wanes and fall approaches, we are reminded that hurricane season is upon us. River levels remain above normal for this time of year. Any future heavy rain events may cause additional flooding along area rivers.

Horry County SC Municipalities and Oak Island NC Invest in Rip Current Signs

In a cooperative effort of Myrtle Beach, Surfside Beach, Horry County SC, NWS Wilmington and NOAA's NC SeaGrant, 150 metal rip current safety signs were purchased for public accesses to the Grand Strand Beaches of Horry County.

The town of Oak Island in Brunswick County got 60 signs for their public accesses.

A few people drown every year along beaches in this area, and it is hoped that these signs will educate swimmers about actions to take should they encounter a rip current. A rip current is a narrow channel of water flowing seaward, making it difficult to return to the beach. The #1 rule: Relax - Don't Panic...then swim parallel to the beach until out of the rip current. It is then easy to return to the beach.

Absolute Zeros Off to a Rocky Start

The National Weather Service office in Wilmington is proud to announce the formation of our very own softball team! Now all we need are fans to cheer us on! Our games are on weekends at Wrightsville Beach Park, and we need all the support we can get! We can't promise many victories. As a matter of fact, we've had five losses in the five games we've played as of September 27. However, we do promise to be entertaining. Come out and join us! You never know. You may get to witness our first victory! The season will continue into early November, and may be longer depending on how many rain outs we have to make up.

Aug 24 @ 2:45 (L 8-9)
Sep 13 @ 1:30 PM (L 1-18)
Sep 21 @ 11:00 AM (L 26-5)
Sep 27* @ 9:45 AM (L 17-15, 11:00 AM (L 13-11)
Oct 5* @ 8:30 AM, 9:45 AM
Oct 11 @ 9:45 AM
Oct 19 @ 4:00 PM
Oct 25 @ 8:30 AM
Nov 2 @ 2:45 PM

***Doubleheader**

Basic Wave Information for Mariners

Most of the marine community relies on the coastal waters and offshore waters forecasts issued by the National Weather Service to plan fishing trips or to decide to stay in port if the weather is bad. These marine forecasts contain a lot of information including wind direction, wind speed and expected weather conditions for the next five days.

In addition, NWS meteorologists forecast the significant wave height, which is defined as the highest third of waves expected over a specific time period. Significant wave height is utilized since it best reflects the average conditions that are observed by mariners.

Unfortunately, the way the wave field is distributed it is possible that one in every thousand waves can be double the significant wave height. So if the forecast is calling for 4 ft seas then it is entirely possible to witness a wave up to seven or 8 ft! Fortunately these waves are very few and very far between, and they do not represent the average conditions. One parameter that the NWS does not forecast, but is available through measurements at NOAA Weather buoy stations, is the wave period. The period for the waves present at a given moment can provide the mariner with a good picture of the sea state. For instance, if the wave height is 5 ft with a period of 10 seconds, then one may consider leaving port. However if given a same height with a period of four to five seconds, then choppy or steep conditions are present making navigation difficultly.

So it is equally important to look at the significant wave height in the marine forecasts, and become familiar with the dominant swell and dominant wind wave to get a good picture of sea conditions. The dominant swell and wind wave are reported once an hour on the National Data Buoy Center (NDBC) website: www.ndbc.noaa.gov for each station in the network. This information is found in the Detailed Wave Summary section of the website (located about halfway down on the individual station's web page). In this section the swell height/period and wind wave height/period are provided. In the future, NWS Wilmington plans to broadcast the detailed wave informaton through NOAA Weather Radio with the hourly weather reports.

Florence County and Cities of Florence and Myrtle Beach join the StormReady Community

Ninety percent of Presidential Disaster Declarations are weather-related, and county and city emergency managers are working with the National Weather Service to prepare for dangerous weather. This summer, Florence County and the cities of Florence and Myrtle Beach were recognized as StormReady.

In our area, Robeson, Dillon, Pender, Brunswick, Horry and Columbus, Georgetown, New Hanover and Florence Counties and the cities of Myrtle Beach and Florence have been formally recognized for meeting the StormReady requirements, and applications are being considered for more.

Nationwide, more than 600 counties and communities have been recognized as StormReady.

StormReady requirements include:

1. 24 hour communications capability and an Emergency Operations Center

2. Multiple means of receiving NWS warnings

3. Local weather monitoring capability, storm spotter training

4. Warning dissemination - weather radios in public

buildings, schools, etc; TV overrides
5. Public preparedness campaigns, safety talks
6. Administrative - Hazardous Weather action plan and drills to test plan

The StormReady program is a guide for counties to prepare and stay prepared - recognition is for three years, and must then be renewed. For more information on the program, call Tom Matheson at 910-762-8043 or see this website: http://www.nws.noaa.gov/stormready/

Winter Outlook?

The National Weather Service Climate Prediction Center has not yet found any reason for this part of the country to have a winter abnormally warm or cold, wet or dry. The equatorial Pacific Ocean temperature is a main driver of the long term weather pattern, and this year it looks to be about normal.

Staff Changes

Charlie Marcom, HMT, retired October 3. Charlie had 35 years of combined military and civil service.

Former MIC, Richard Anthony, retired August 2. Richard had 32 years of federal service.

Mike Caropolo, Meteorologist-In-Charge, Wilmington, NC, reported here in early September. Mike started his NWS career as a Meteorologist Intern at the weather service office here in Wilmington, NC, in 1989. He moved on to WSFO New York as a General Forecaster in 1990, and then to Albany, NY as a Senior Forecaster in 1994. Since 1999, he has served as the Eastern Region Chair for NWSEO. Mike received a B.S. in Atmospheric Science from the State University of New York at Albany in 1985 and a Masters in Public Administration, also from SUNY Albany, in 2001.

NWS Wilmington Activities

Outreach

Local Middle Students Receive a Lesson in Weather

WCM Tom Matheson traveled to local Williston Middle School to enlighten students about meteorology. Tom spoke to a total of 150 7th grade students and their teachers in his two presentations. He detailed the science, technology and human impact of weather.

Local Laney High School student, Michelle Weiskoph, interviewed WCM Tom Matheson for a school project. The interview focused mainly on hurricanes, however, Michelle is interested in pursuing a degree in meteorology as well.

Hurricane Coordination

WFO Wilmington, NC staffers had a busy week as Hurricane Isabel set its eye on the Carolina coast. In addition to all the in-house NWS Conference Calls before and during the event, staff members took part in numerous county and state conference calls, briefing emergency officials through the event.

WCM Tom Matheson was interviewed by two local media outlets concerning Hurricane Fabian. Tom detailed the forecast track of Fabian as well as the local surf and rip current threat as the storm passed offshore of the Carolinas.

WCM Tom Matheson provided Horry County Emergency Management officials Randy Webster and Tabby Shelton a tour of the NWS office. Tom also helped the pair get a better handle on ILM operations.

Training/Science

WFO ILM held a one-day IFPS Workshop on September 3rd. Forecasters and HMTs learned about IFPS forecast methodology as well as new Smart Tools. Representatives

from NWS GSP and CHS were invited to talk about collaboration among neighboring WFOs.

WFO ILM staff members participated in two separate MPE teletraining sessions. The Southeast River Forecast Center provided the training to detail the background and knobology of the Multi-Sensor Precipitation Estimator Application in the WHFS software.

Forecaster Tim Armstrong traveled to Raleigh, NC to take part in the NWS Eastern Region Climate Workshop sponsored by OCWWS, CSD and ERH. The workshop was geared towards the roles and responsibilities of the field, regional and national NWS offices.

SOO Reid Hawkins traveled to Boulder, Co to participate in the COMET Boundary Layer Symposium.

Lead Forecaster and Marine Program Leader Steve Pfaff traveled to Morehead City, NC to take part in the NC Sea Grant Panel Review. Steve and NC Sea Grant members briefed the National Sea Grant panel on the partnership between the NWS and NC Sea Grant concerning rip current forecasting and beach community awareness.

Hydrology

Service Hydrologist Paula Neuherz and HMT Chuck Holtzinger introduced new MIC Mike Caropolo to the Wilmington, NC Hydrologic Service Area. The group visited the three U.S. Army Corps of Engineers Lock & Dams along the length of the river and coordinated with the workers about recent flood levels. The group also toured Lake Waccamaw and coordinated with the visitor center concerning their new automated weather system soon to be installed. Their weather information will be passed on to the NWS office.

Flash Flood Safety Rules

- **Avoid walking, swimming or driving in flood waters**
- **Stay away from high water, storm drains, ditches, ravines, or culverts. If moving swiftly, even water six inches deep can knock you off your feet.**
- **If you come upon flood waters, stop, turn around, and go another way. Climb to higher ground.**
- **Do not let children play near storm drains.**

NOAA Weather Radio

162.400 MHz - Conway/Mrytle Beach
162.400 MHz - Columbia
162.550 MHz - Charleston
162.550 MHz - Florence
162.550 MHz - Wilmington, NC
162.500 MHz - Georgetown SC - *NEW*

How Far Away is a Thunderstorm?

- Count the number of seconds between a flash of lightning and the next clap of thunder.
- Divide this number by 5 to determine the distance to the lightning in miles.

Experimental Digital Forecast Products

Take a look on our website, under Experimental Forecast Images, at our contributions to the National Digital Forecast Database. See images of our weather forecasts in 3 and 6 hour increments for the next week. During hurricane events, the National Hurricane Center contributes wind images for the area that we incorporate.
website:
http://www.erh.noaa.gov/ilm

	APR		MAY		JUN		FOR THE PERIOD	
	TMP DEP	RAIN/DEP	TMP/DEP	RAIN/DEP	TMP/DEP	RAIN/DEP	TMP/DEP	RAIN/DEP
WILMINGTON	61.6 /-1.1	6.48/ 3.54	70.8/ 0.6	7.44/ 3.44	77.2/ 0.2	5.42/ 0.06	69.9/-0.1	6.44/ 2.35
NORTH MYRTLE BEACH	60.9 /-1.1	6.58/ 4.46	70.1/ 0.2	3.96/ 0.97	76.7/ 0.1	7.91/ 4.25	69.2/-0.3	6.15/ 3.23
FLORENCE	61.1 /-2.0	3.31/ 0.52	70.1/-0.9	2.22/-1.09	76.2/-1.4	5.86/ 1.59	69.1/-1.4	3.80/ 0.34
LUMBERTON	60.4 /-0.1	4.82/ 1.99	69.8/ 1.4	6.33/ 2.36	76.4/ 0.8	2.62/-1.94	68.9/ 0.7	4.59/ 0.80
OVERALL REGION WIDE	61.0 /-1.1	5.30/ 2.63	70.2/ 0.3	4.99/ 1.42	76.6/-0.1	5.45/ 1.00	69.3/-0.3	5.25/ 1.68

+/- .1 DUE TO ROUNDING